# Introduction to the Special Issue on Biophotonics—Part 2

WELCOME to the IEEE JOURNAL OF SELECTED TOPICS IN QUANTUM ELECTRONICS (JSTQE) Special Issue on Biophotonics—Part 2! Because of significant interest in the Biophotonics field, the Editorial Board is publishing the IEEE JSTQE Special Issue on Biophotonics in two parts. Following the first JSTQE Special Issue on Biophotonics—Part 1, which was published in the May/June 2010 JSTQE Issue, we are pleased to introduce you to the JSTQE Special Issue on Biophotonics—Part 2.

The goal of this JSTQE Special Issue on Biophotonics is to provide a cross-disciplinary forum for state-of-the-art developments in biophotonics topics, including the recent progress and trends in minimally invasive biophotonics imaging, sensing, diagnostics, therapeutics, and instrumentation, as well as the emerging field of nanobiophotonics. The papers published in this issue cover a broad range of areas including:

1) advanced bioimaging;
2) multifunctional microscopy, endoscopy, and spectroscopy methods;
3) novel approaches in biophotonic diagnostics and therapeutics;
4) light–cell and light–tissue interactions;
5) novel biosensing techniques;
6) advanced nanobiophotonics;
7) novel laser, fiber-optics, and electro-optics biophotonic tools and devices.

Comprehensive overviews of the current status and future trends, as well as original results and recent developments in the field of biophotonics and nanobiophotonics will be discussed.

This issue contains 37 papers, including 18 Invited and 19 Contributed papers, authored by well-established research groups and promising scientists from all over the world. The Invited Papers include extended reviews on recent biophotonics and nanobiophotonics developments, and clinical applications in the areas of ultrahigh-resolution bioimaging; combined multifunctional microscopy, endoscopy, and spectroscopy methods; novel approaches in precancer diagnostics, photodynamic therapy, photoacoustic tomography, biosensing, and advanced methods for nanoimaging and nanobiosensing. The Contributed Papers cover a broad variety of key biophotonics research areas, including recently obtained original results on high-resolution label-free bioimaging and sensing, DNA detection, optofluidic intracavity spectroscopy, holographic microscopy, white light spectroscopy diagnostics, effective optical nerve stimulation, and development of novel biophotonics tools and devices.

The Editors hope you will find this JSTQE Special Issue on Biophotonics—Part 2 to be interesting and useful reference that will impact and stimulate the promotion of further advances in Biophotonics.

## ACKNOWLEDGMENT

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He has over 20 years of experience in the United States, Europe, and Japan in the field of quantum physics and laser technologies, fiber-optics, laser medicine, noninvasive optical diagnostics and therapeutics, and biosensing and ultrahigh-resolution optical imaging. In 1995, he was with the Optoelectronics Division, Strathclyde University, Glasgow, U.K. From 1995 to 1997, he was with the Laser Technology Laboratory, Institute of Physical and Chemical Research, Tokyo, Japan. From 1998 to 2001, he was an American Academy of Science/National Research Council Research Associate in the U.S. Food and Drug Administration (FDA), Silver Spring, MD. Since May 2001, he has been with the Center for Devices and Radiological Health, FDA, where he is currently the Leader of the Optical Therapeutics and Medical Nanophotonics Laboratory. He is also an Adjunct Professor in the Department of Bioengineering, University of Maryland, College Park, MD. He is the author or coauthor of more than 300 papers published in peer-reviewed journals and has made presentations at major national and international conferences and meetings and a Guest Editor on Advanced Nanobiophotonics and Nanobiomaterials for the *Nanobiotechnology* Journal. His research interests include the development of novel and simple minimally invasive biophotonics and nanobiophotonics techniques, including multifunctional modalities and approaches for studying light–tissue interactions at cellular, intracellular, and molecular level, and ultrahigh-resolution bioimaging and biosensing beyond the diffraction limit in the subwavelength nanoscale range.

Dr. Ilev was an IEEE Photonics Society (formerly Lasers and Electro-Optics Society) Biophotonics Committee Chair. He has organized and chaired conferences on biophotonics and nanobiophotonics topics within the IEEE Photonics Society, the IEEE Engineering in Medicine and Biology Society, The International Society for Optical Engineers, and the Optical Society of America. He is an Associate Editor of the IEEE TRANSACTIONS ON BIOMEDICAL ENGINEERING, a Primary Guest Editor of the IEEE JOURNAL OF SELECTED TOPICS IN QUANTUM ELECTRONICS on BIOPHOTONICS.

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Prof. Wang is a Fellow of the American Institute for Medical and Biological Engineering, the Optical Society of America (OSA), and The International Society for Optical Engineers. He serves as an equal Co-Chair for the Annual Conference on Photons Plus Ultrasound, the 2010 Gordon Conference on Lasers in Medicine and Biology, and the 2010 OSA Topical Meeting on Biomedical Optics. He also Co-Chairs the International Biomedical Optics Society. He is a Chartered Member on a National Institutes of Health (NIH) Study Section. He serves as the Founding Chairs of the Scientific Advisory Boards for two companies commercializing his inventions. He was the recipient of an NIH FIRST Award, the National Science Foundation (NSF) CAREER Award, and the 2010 Joseph W. Goodman Book Writing Award.

**Stephen A. Boppart** (S'90–M'90–SM'06) was born in Harvard, IL, in 1968. He received the B.S. degree in electrical and bioengineering and the M.S. degree in electrical engineering from the University of Illinois at Urbana-Champaign, Urbana-Champaign, in 1990 and 1991, respectively, the Ph.D. degree in electrical and medical engineering from Massachusetts Institute of Technology, Cambridge, in 1998, and the M.D. degree from Harvard Medical School, Boston, MA, in 2000.

In 2005, he completed residency training in internal medicine from the University of Illinois at Urbana-Champaign. He was a Research Scientist with the Air Force Laser Laboratory, Brooks Air Force Base, San Antonio, TX, where he was engaged in the research on developing national (American National Standards Institute) and the Air Force laser safety standards. Since 2000, he has been with the University of Illinois at Urbana-Champaign, where he is currently Professor of electrical and computer engineering, bioengineering, and medicine, and the Head of the Biophotonics Imaging Laboratory, Beckman Institute for Advanced Science and Technology. He is also the Leader of a campus-wide imaging initiative. He is the author or coauthor of more than 165 invited and contributed publications and has made over 400 invited and contributed presentations. He holds more than 25 patents filed or pending. His current research interests include the development of novel optical imaging technologies for biological and medical applications, with particular emphasis on translating these to clinical applications in cancer detection and diagnosis.

Prof. Boppart is a Fellow of the Optical Society of America and The International Society for Optical Engineers, and a member of the Society for Molecular Imaging, the Academy of Molecular Imaging, the American Association for the Advancement of Science, the American Association for Cancer Research, and the American Medical Association. He was named as one of the Top 100 Innovators in the World by the Technology Review Magazine for his research in medical technology in 2002. He was the recipient of the IEEE Engineering in Medicine and Biology Society Early Career Achievement Award in 2005.

**Stefan Andersson-Engels** received the M.Sc. degree in engineering physics and the Ph.D. degree in physics from Lund University, Lund, Sweden, in 1985 and 1990, respectively.

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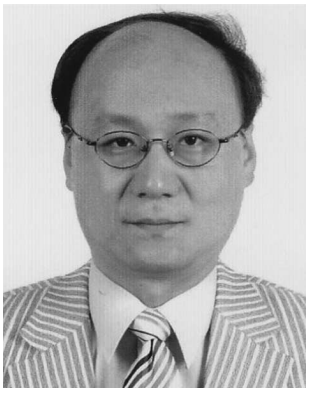

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Prof. Kim is currently a Board Member of the Optical Society of Korea and the Korean Society of Medical and Biological Engineering.